

Spot Safety Project Evaluation

Project Log # 200712071

Spot Safety Project # 04-99-223

**Spot Safety Project Evaluation of the Traffic Signal Installation
At the Intersection of NC 42 (Herring Ave) and SR 1327 (London Church Rd)
City of Wilson, Wilson County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Jason B. Schronce

1-23-2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-99-223 – The Intersection of NC 42 (Herring Ave) and SR 1327 (London Church Rd) in Wilson County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a fully actuated traffic signal with an eight (8) phase cabinet for future expansion. NC 42 (Herring Ave) is a five lane facility with two lanes provided as thru lanes in each direction and a center turn lane that provides dedicated left turn lanes at the intersection. SR 1327 (also listed as SR 1700) is a two lane facility that widens to include a right turn lane at NC 42. The subject location is a three-leg intersection, which was controlled by a stop sign on SR 1327 (London Church Rd). Opposite of SR 1327 is the driveway for the City of Wilson Operations Center which was included into the countermeasure signal.

The original statement of problem was that insufficient gaps in traffic on NC 42 were preventing motorists, especially City of Wilson vehicles, from entering the traffic flow safely. The intersection met signal warrants 1, 2, 9B, and 11.

The initial crash analysis was completed from January 1, 1996 to December 31, 1998 with twelve (12) reported crashes, nine (9) of which were deemed correctable by the signal installation. The final completion date for the improvement at the subject intersection was on May 30, 2002 with a total cost of \$40,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from May 1, 2002 to June 30, 2002. The before period consisted of reported crashes from March 1, 1997 through April 30, 2002 (5 years and 2 months) and the after period consisted of reported crashes from July 1, 2002 through August 31, 2007 (5 years and 2 months). The ending date for this analysis was determined by the date of available data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle

crashes that occurred at the signal. Frontal impact collisions from the PVA within the study limits were not included as target crashes.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	22	9	- 59.09 %
Total Severity Index	3.35	5.11	52.54 %
Target Crashes	4	3	- 25.00 %
Target Crash Severity Index	2.85	3.47	21.75 %
Volume	14,400	12,500	- 13.19 %
<u>Injury Crash Summary - Total</u>			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	2	1	- 50.00 %
Class C Injury Crashes	5	4	- 20.00 %
Total Injury Crashes	7	5	- 28.57 %

The naive before and after analysis at the treatment location resulted in a 59 percent decrease in Total Crashes, a 25 percent decrease in Target Crashes, but a 52 percent increase in the Total Severity Index. The before period ADT year was 1999 and the after period ADT year was 2005.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 59 percent decrease in Total Crashes and a 25 percent decrease in Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the target crashes from the before to the after period remained consistent with left turn style collisions. One crash (crash number 3) in the after period was the result of an eastbound Herring Avenue vehicle running the red light. We see an increase in target crash severity simply from the low number of collisions; the difference was a B-class collision in the after period versus a C-class in the before period.

The signal appears to have significantly helped the overall crash occurrence at the intersection. Collisions involving access in or out of the Handy Mart PVA reduced from six (6) to three (3). It can be concluded that the motorists are utilizing the signal for access to Herring Avenue or gaps are now present for vehicles entering and exiting the PVA to do so safely. Rear-end crashes also reduced from nine (9) to one (1).

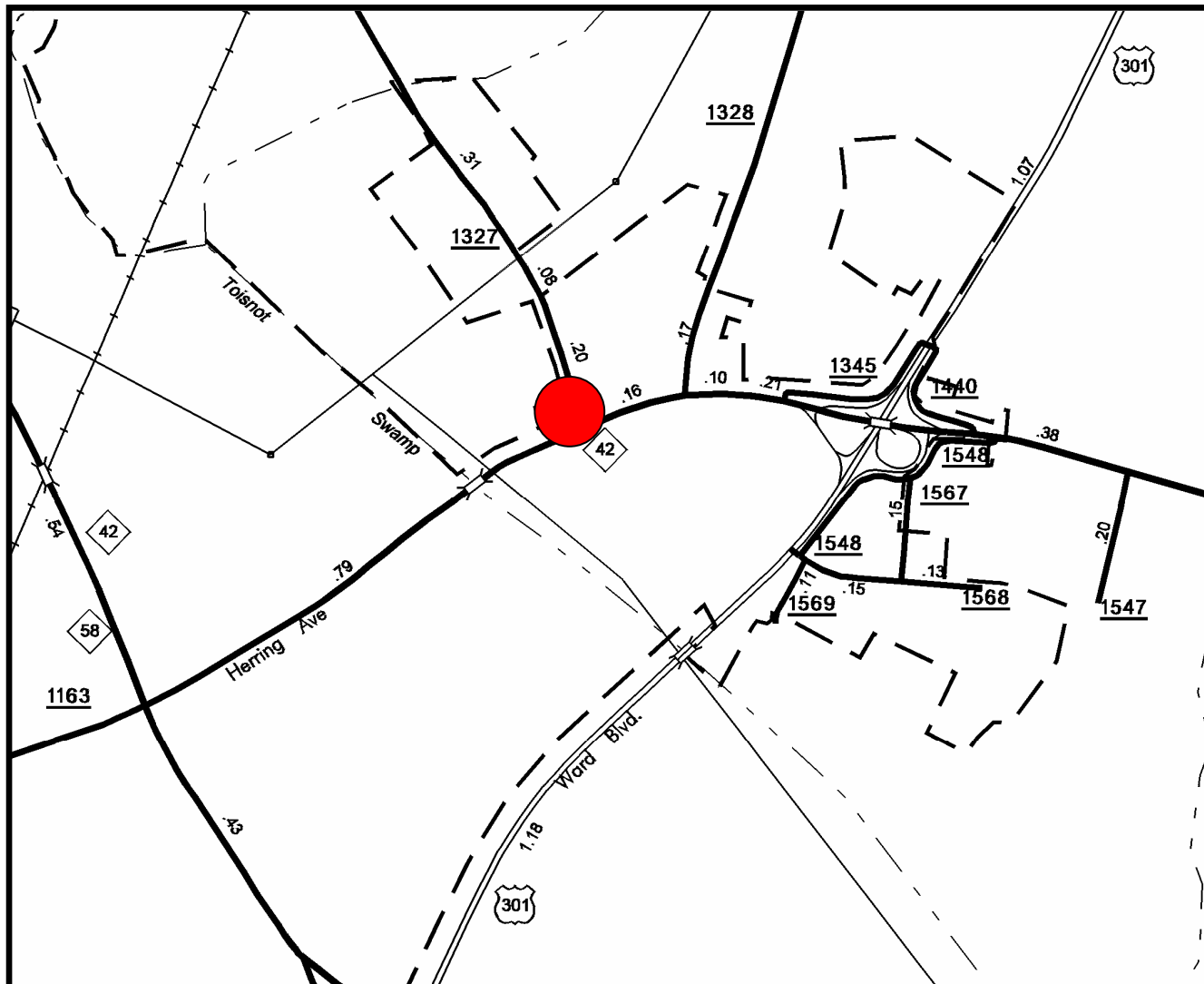
The calculated benefit to cost ratio for this project is 1.68 considering total crashes. The benefit to cost ratio considering only target crashes is 0.08. The benefits are calculated using the change in

annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection including the gated entrance of the City of Wilson Operations Center.

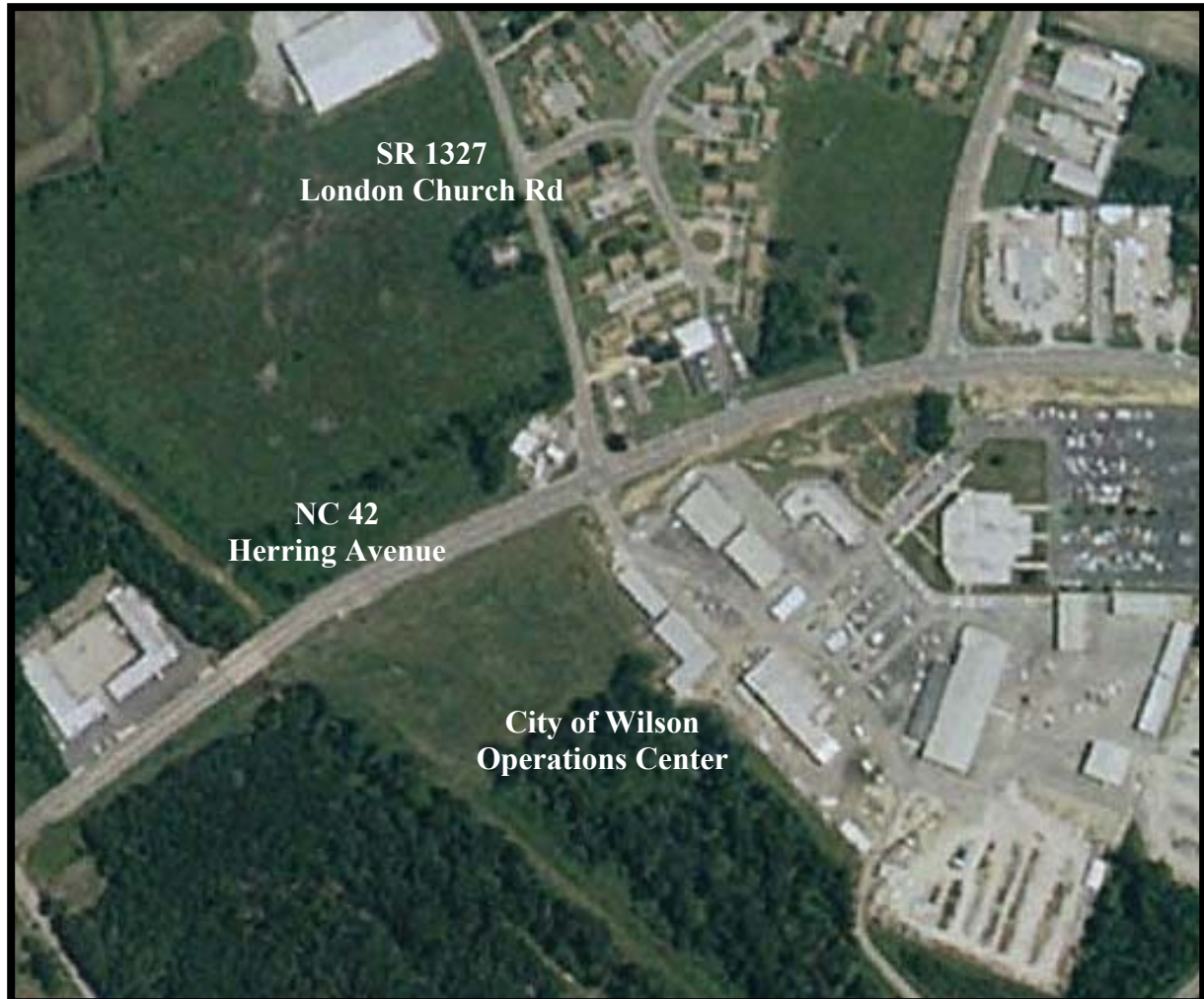
As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

**Location Map
Wilson County
Evaluation of Spot Safety Project # 04-99-223**



Treatment Location: NC-42 (Herring Avenue) at SR 1327 (London Church Road), City of Wilson

SS# 04-99-223 Aerial Map
City of Wilson



TREATMENT SITE PHOTOS TAKEN 1/16/2008



Traveling East on NC 42 (Herring Ave)



Traveling West on NC 42 (Herring Ave)



Traveling South on SR 1327 (London Church Road)



Traveling North from City of Wilson's Operations Center (gated complex)

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 42 at London Church Rd
COUNTY: Wilson
FILE NO.: SS 04-99-223

BY: JBS
DATE: 1/22/2008
NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - New Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$40,000	10	0.149	\$5,961
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$40,000	10	0.149	\$5,961
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$2,200
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$900
TOTAL ANNUAL COST=	\$9,061
TOTAL COST OF PROJECT=	\$40,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.17	0	0.00	7	1.35	15	2.90	\$35,687
AFTER	5.17	0	0.00	5	0.97	4	0.77	\$20,426

Annual Benefits from Crash Cost Savings \$15,261

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$6,200

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 1.68

TOTAL COST OF PROJECT - \$40,000 COMPREHENSIVE B/C RATIO - 1.68

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 42 at London Church Road

BY: JBS

COUNTY: Wilson

DATE: 1/22/2008

FILE NO.: SS 04-99-223

NOTES: Target Crashes - Frontal Impact in Intersection

DETAILED COST: TYPE IMPROVEMENT - New Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$40,000	10	0.149	\$5,961
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$40,000	10	0.149	\$5,961
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ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$900
TOTAL ANNUAL COST=	\$9,061
TOTAL COST OF PROJECT=	\$40,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

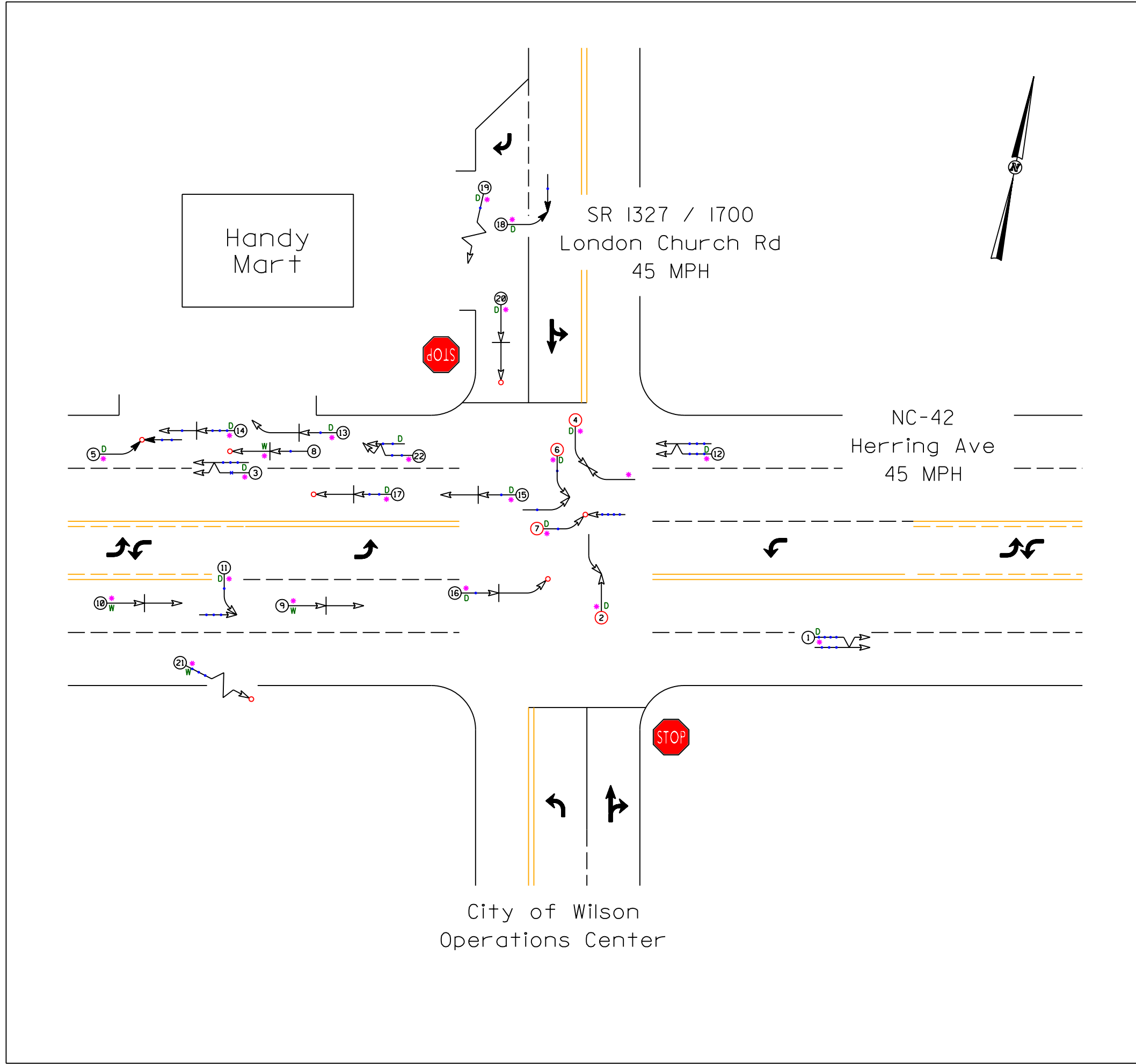
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.17	0	0.00	1	0.19	3	0.58	\$5,745
AFTER	5.17	0	0.00	1	0.19	2	0.39	\$4,990

Annual Benefits from Crash Cost Savings \$754

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$8,307)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.08

TOTAL COST OF PROJECT - \$40,000 COMPREHENSIVE B/C RATIO - 0.08



LEGEND

MOVING VEHICLE

PEDESTRIAN

PARKED VEHICLE

PARKING VEHICLE

FIXED OBJECT

HEAD ON

REAR END

RAN OFF ROAD

ANGLE

TURNING

BACKING

SIDESWIPE

OUT OF CONTROL

INJURY

FATALITY

9 MPH OR LESS

10 MPH TO 19

20 MPH TO 29

30 MPH TO 39

40 MPH TO 49

50 MPH TO 59

60 MPH TO 69

70 AND UP

SPEED UNKNOWN

P PEDESTRIAN

T TRAIN

• DRIVER AT FAULT

D DRY

W WET

I ICY OR SNOWY

O ONLY

SS# 04-99-223
Wilson County
BEFORE Period
3/1/97 - 4/30/02
NC 42 at SR 1327

⊕ Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY PLANNING AND ANALYSIS

HIGHWAY SAFETY IMPROVEMENT PROGRAM

HIGHWAY SAFETY MANAGEMENT

RAILROAD-HIGHWAY SAFETY MANAGEMENT

COLLISION DIAGRAM

DIVISION: 4

AREA: 2

STUDY PERIOD: 3/1/1997 TO 4/30/2002

DISTANCE: Y-LINE = 150FT

ANALYSIS PREPARED BY: JBS

ANALYSIS CHECKED BY: BR

DIAGRAM PREPARED BY: JBS

DIAGRAM REVIEWED BY: ST

SCALE: NOT TO SCALE

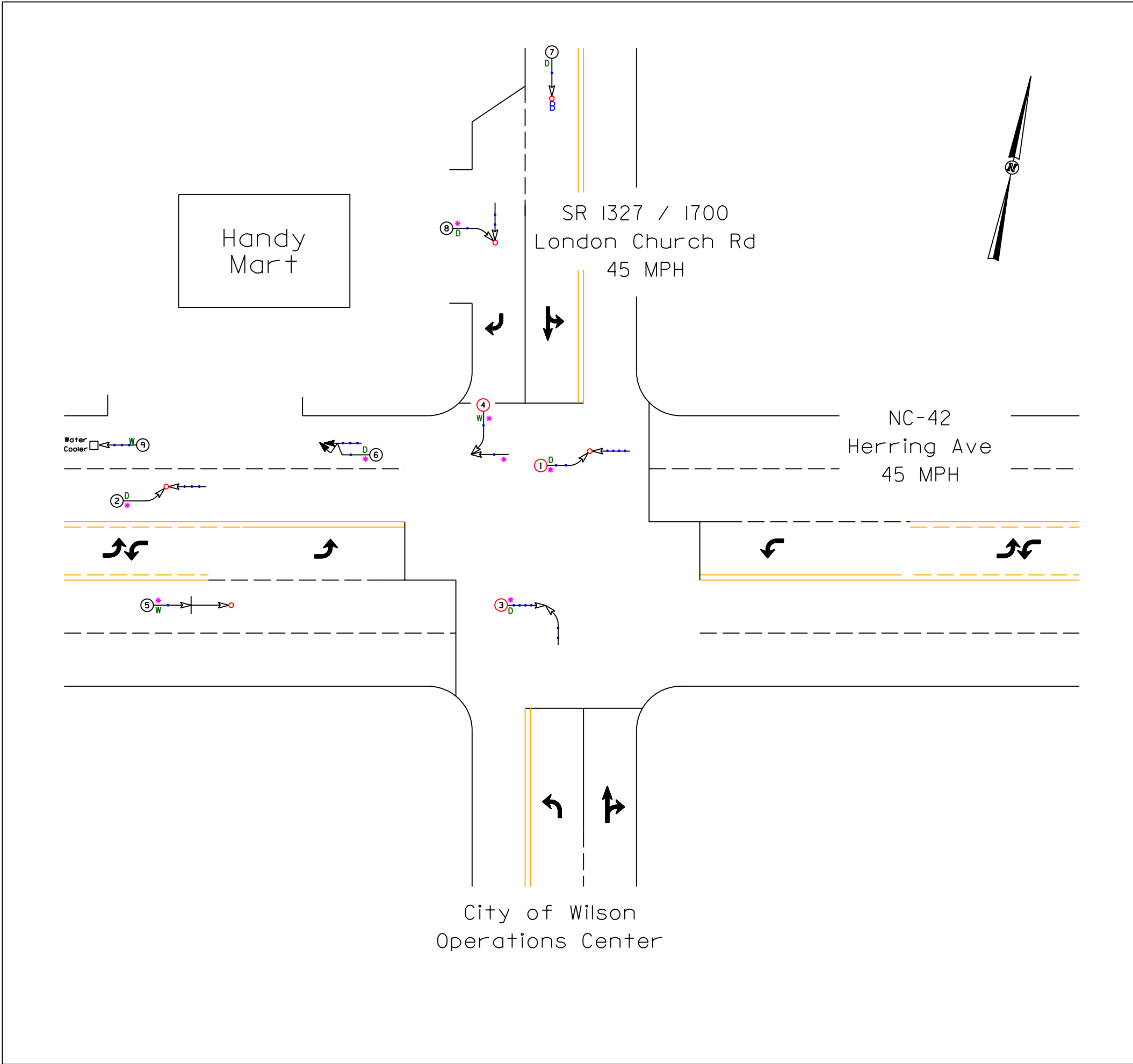
DATE: 1-10-2008

LOG NUMBER: SS# 04-99-223

N.C. DEPARTMENT of TRANSPORTATION

DIVISION of HIGHWAYS

TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH



LEGEND

MOVING VEHICLE

PEDESTRIAN

PARKED VEHICLE

PARKING VEHICLE

FIXED OBJECT

HEAD ON

REAR END

RAN OFF ROAD

ANGLE

TURNING

BACKING

SIDESWIPE

OUT OF CONTROL

INJURY

FATALITY

9 MPH OR LESS

10 MPH TO 19

20 MPH TO 29

30 MPH TO 39

40 MPH TO 49

50 MPH TO 59

60 MPH TO 69

70 AND UP

SPEED UNKNOWN

P PEDESTRIAN

T TRAIN

• DRIVER AT FAULT

D DRY

W WET

I ICY OR SNOWY

O ONLY

SS# 04-99-223
Wilson County
AFTER Period
7/1/02 - 8/31/07
NC 42 at SR 1327

New Signalized
Intersection

⊕ Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY
PLANNING AND
ANALYSIS

HIGHWAY SAFETY
IMPROVEMENT
PROGRAM

HIGHWAY SAFETY
MANAGEMENT

RAILROAD-HIGHWAY
SAFETY MANAGEMENT

COLLISION DIAGRAM

DIVISION: 4

AREA: 2

STUDY PERIOD: 7/1/2002 TO 8/31/2007

DISTANCE: Y-LINE = 150FT

ANALYSIS PREPARED BY: JBS

ANALYSIS CHECKED BY: BR

DIAGRAM PREPARED BY: JBS

DIAGRAM REVIEWED BY: ST

SCALE: NOT TO SCALE

DATE: 1-10-2008

LOG NUMBER: SS* 04-99-223

N.C. DEPARTMENT of TRANSPORTATION

DIVISION of HIGHWAYS

TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH

04-99-223 collision diagrams.dgn 3/20/2008 10:48:51 AM